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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/553,416

10/17/2005

Tadahiro Ohmi

039262-0143

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22428 7590 10/28/2008  
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EXAMINER

TRAN, THIEN F

ART UNIT

PAPER NUMBER

2895

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/553,416	<b>Applicant(s)</b> OHMI ET AL.	
	<b>Examiner</b> Thien F. Tran	<b>Art Unit</b> 2895	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 13-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/17/05, 11/15/05</u> .                                      | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al (US 5,170,231) in view of Ohmi (US 6,677,648).

Fujii et al disclose a semiconductor device (Fig. 3A) characterized by comprising a semiconductor substrate 30 made of SiC; and an insulating film 33 of thermal oxide formed on the semiconductor substrate. Fujii et al does not disclose the insulating film 33 containing a rare gas at least partly. Ohmi discloses forming silicon oxide films having, even though at low temperature plasma oxidation, characteristics and reliability superior to those of silicon thermal oxide films formed at a high temperature. The silicon oxide films containing krypton (a rare gas). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to substitute the thermal silicon oxide of the gate insulating film 33 with the silicon oxide film containing krypton as taught by Ohmi in order to realize a high quality silicon oxide film superior to a conventional thermal oxide film so that a high performance transistor integrated circuit can be realized, such as an improvement of reliability of element isolation and an improvement of drive performance of a MOS transistor (see col. 3, lines 58-62, and col. 4, lines 4-7). The claim limitations "formed by a plasma treatment" are taken to be

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product by process limitations. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

Regarding claim 2, the insulating film includes a gate insulating film.

Regarding claim 3, the insulating film contains at least one of krypton (Kr), argon (Ar), and xenon (Xe) as the rare gas.

Regarding claim 4, at least part of said insulating film is one of an oxide film, an oxynitride film, and a nitride film.

Regarding claim 5, the SiC forming the semiconductor substrate 30 is a single crystal.

Regarding claim 6, the claim limitations “formed by plasma treatment where a temperature of the substrate is 600<sup>0</sup>C or less” are taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it

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clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

Regarding claim 7, the claim limitations “formed by one of direct oxidation, direct nitriding, and direct oxynitriding of a microwave-excited plasma” are taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al.*, 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

Regarding claim 8, the insulating film includes at least one of an oxide film, a nitride film, and an oxynitride film. The claim limitations “formed by microwave-excited plasma CVD” are taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al.*, 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ

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964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

Regarding claim 9, the insulating film includes at least one of an oxide film, a nitride film, and an oxynitride film. The claim limitations “formed by one of direct oxidation, direct nitriding, and direct oxynitriding of a microwave-excited plasma and then by microwave-excited plasma CVD” are taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

Regarding claim 10, Fuji et al. in view of Ohmi as described above discloses all elements as claimed. The claim limitations “formed by a plasma treatment” and “formed by one of direct oxidation, direct nitriding, and direct oxynitriding of a microwave-excited plasma under a condition where a temperature of the substrate is 600<sup>0</sup>C or less” are

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taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al.*, 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

Regarding claim 11, *Fujii et al.* in view of *Ohmi* as described above discloses all elements as claimed. The claim limitations “formed by a plasma treatment” and “formed by one of oxidation, nitriding, and oxynitriding by microwave-excited plasma CVD under a condition where a temperature of the substrate is 600<sup>0</sup>C or less” are taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al.*, 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

Regarding claim 12, Fujii et al. in view of Ohmi as described above discloses all elements as claimed. The claim limitations “formed by a plasma treatment” and “is formed, under a condition where a temperature of the substrate is 600<sup>0</sup> C or less, by one of direct oxidation, direct nitriding, and direct oxynitriding of a microwave-excited plasma and then by one of oxidation, nitriding, and oxynitriding by microwave-excited plasma CVD” are taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

### ***Response to Arguments***

Applicant's arguments filed 07/17/2008 have been fully considered but they are not persuasive. Applicant contends that Fujii and Ohmi do not teach the combination of features of an insulating film formed by a plasma treatment and containing a rare gas on a SiC substrate or the benefits in suppression of an increase in interface states as described in the specification. The examiner respectfully disagrees with the remark because it is clear as explained above that Fujii in view of Ohmi disclose the same structure as claimed, an insulating film containing a rare gas on a SiC substrate. Also,



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“a plasma treatment” is taken to be process limitations that cannot impart patentability to a product claim where the product is not patentably distinguished over the prior art. In *re Dike*, 394 F.2d 584, 157 USPQ 581 (CCPA 1968). It is noted that Ohmi also discloses the insulating film formed by a plasma treatment and containing a rare gas as claimed.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., suppression of an increase in interface states) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re*

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*Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, reasoning has been provided in the statement of the rejection in the office action mailed 04/17/2008. It is noted that Ohmi (col. 3, lines 58-62 and col. 4, lines 4-7) clearly discloses a good reason why one skilled in the art would like to replace a conventional thermal silicon oxide film of Fujii with the silicon oxide film containing a rare gas disclosed by Ohmi.

In response to applicant's argument that reason to combine references is not the same as applicant's, if it is obvious to combine references for one reason it is obvious to combine references for all reasons. In re Graf, 145 USPQ 197 (CCPA 1965); In re Finsterwalder, 168 USPQ 530 (USPQ 1970); In re Kronig, 539 F.2d 1300, 190 USPQ 425 (CCPA 1976). In re Dillon, 892 F.2d 1544, 13 USPQ 1337 (1989); In re Dillon 919 F.2d 688, 16 USPQ 1897 Fed. Cir. 1990.

In response to applicant's argument that the present inventors recognize a difference between silicon and SiC and degradation of the properties of the insulating film, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

In response to applicant's argument that neither of these prior art references recognize the problem solved by the present invention, it has been held that the mere fact that the references fail to evince an appreciation of the problem identified and solved by applicant is not, standing alone, conclusive evidence of the nonobviousness of the claimed subject matter. The reference may suggest doing what applicant has

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done even though workers in the art were ignorant of the existence of the problem. In re Gershon, 152 USPQ 602 (CCPA 1967). Furthermore, it not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant. In re Linter, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972); in re Dillon, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), cert. Denied, 500 U.S. 904 (1991).

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thien F. Tran whose telephone number is (571) 272-1665. The examiner can normally be reached on 7:30AM - 4:00PM Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew N. Richards can be reached on (571) 272-1736. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thien F Tran  
Primary Examiner  
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